PREVALENCE AND CAUSES OF
BLINDNESS IN ICELAND
by
Guomundur Bjornsson

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noted when hyaluronidase was injected into the anterior chamber of the rabbit eye. It is suggested that the difference in the results obtained may have been due to differences in preparations used or in the degree of purification of the earlier hyaluronidase product.

On the basis of these studies, further clinical investigations utilizing anterior-chamber injections of hyaluronidase are planned.

303 East Chicago Avenue (11).

References

1. Atkinson, W. S.: Use of hyaluronidase with local anesthesia in ophthalmology; Preliminary report. Arch. Ophth., **42**:628 (Nov.) 1949.
2. Lebensohn, J. E.: Hyaluronidase in ocular surgery and therapy. Am. J. Ophth., **33**:865 (June) 1950.
3. Kadin, M.: Hyaluronidase in thyrotropic exophthalmos; Report of a case. Am. J. Ophth., **33**:962 (June) 1950.
4. Tassman, I. S.: The use of hyaluronidase in ophthalmology, Am. J. Ophth., **35**:683 (May) 1952.
5. Carriker, R. F.: The use of hyaluronidase in ophthalmology. Am. J. Ophth., **35**:1765 (Dec.) 1952.
6. Linn, J. G., Jr., and Ozment, T. L.: Some effects of injection of hyaluronidase into the anterior chamber. Am. J. Ophth., **33**:33 (Jan.) 1950.
7. Moor, W. E., and Shahan, P.: Some possible applications of spreading factors in ophthalmology: Preliminary report. Midwest Sect. A. Res. Ophth., St. Louis, 1949.
8. Miles, P. W.: In discussion of Linn, J. G., Jr., and Ozment, T. L.: Some effects of injection of hyaluronidase into the anterior chamber. Am. J. Ophth., **33**:33 (Jan.) 1950.
9. von Sallmann, L.: In discussion of Linn, J. G., Jr., and Ozment, T. L.: Some effects of injection of hyaluronidase into the anterior chamber. Am. J. Ophth., **33**:33 (Jan.) 1950.

PREVALENCE AND CAUSES OF BLINDNESS IN ICELAND

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With special reference to glaucoma simplex

Guõmundur Björnsson, M.D.
Reykjavik, Iceland

Previous information

In the Annual Health Report for Iceland, figures are given showing the number of blind persons reported by the district physicians. As stated there, however, the report is far from exhaustive. Thus the figure of 295 given for 1948 and referred to in the *Epidemiological and Vital Statistics Report* (**6**: No. 1, 1953) is by far too low. The true number of blind persons has undoubtedly been well over 400 as will be seen from this article.

More accurate information on the prevalence of blindness is obtained through the census methods. Not only are the blind enumerated and registered at the general decennial censuses but they are also registered toward the end of each year, when the parish rectors and municipal authorities take the annual census.

The census papers include a column in which is stated whether the enumerated person suffers from blindness. According to the instructions given "all persons who are totally blind, or cannot find their way in places unknown to them before by means of their sight," shall be registered as blind.

Table 1 shows the number of blind persons registered and the rate of blindness according to the census of 1880 and 1890 and the decennial censuses from 1910 on.

Special survey, 1940

An experienced ophthalmologist in Reykjavik (Sveinsson, 1944) examined critically the blind register for 1940. With the aid of the Iceland Association for the Aid of Blind People, he tried to contact all the registered blind and to obtain information from the doctors about those he had not seen himself. He arrived at the conclusion that the number of blind persons was at least 409 (379 ac-

TABLE 1

OBSERVATIONS AFTER INJECTION OF HYALURONIDASE INTO THE ANTERIOR CHAMBERS OF RABBIT EYES

Findings	Before Injection	Hours After Initial Injection				5th Day	7th Day	14th Day
		24	48	72	96			
EYE 1								
Conjunctival hyperemia	0	+(Local)	±(Local)	±	±	0	0	0
Ciliary Flush	0	0	0	+	+	0	0	0
Corneal Haze	0	0	0	0	0	0	0	0
Pupil Size	6	8	8	8	8	8	7	8
Iris Hyperemia	0	0	0	+	+	+	0	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 2								
Conjunctival hyperemia	0	0	0	0	0	0	0	
Ciliary Flush	0	0	0	0	0	0	0	
Corneal haze	0	0	0	0	+(Local)	0	0	
Pupil Size	7	8	8	8	7	7	6	
Iris hyperemia	0	0	0	0	+	±	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 3								
Conjunctival hyperemia	0	0	0	±	0	0	0	0
Ciliary flush	0	±	±	±	±	+	0	0
Corneal haze	0	±(Local)	±(Local)	0	±(Local)	±(Local)	0	0
Pupil size	8	7	7	6	6	7	7	7
Iris hyperemia	0	++	+	+	+	+	0	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 4								
Conjunctival hyperemia	0	0	0	±	±	0	0	0
Ciliary flush	0	+	±	++(Local)	+	+	+	0
Corneal haze	0	++(Local)	+(Local)	0	0	0	0	0
Pupil size	7	7	7	7	6	6	7	5
Iris hyperemia	0	+	+	+	+	+	+	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 5								
Conjunctival hyperemia	0	0	±	0	0	0	0	
Ciliary flush	0	±	+	+	+	0	0	
Corneal haze	0	++(Local)	+	0	0	0	0	
Pupil size	9	8	8	6	9	5	6	
Iris hyperemia	0	0	0	0	±	0	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 6								
Conjunctival hyperemia	0	±	±	±	0	±	0	
Ciliary flush	0	++	+	++	±	+	0	
Corneal haze	0	±(Local)	±(Local)	0	+(Local)	+	0	
Pupil size	8	8	8	7	9	7	7	
Iris hyperemia	0	++	+	+(Local)	0	0	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 7								
Conjunctival hyperemia	0	0	+	+	±	0	0	
Ciliary flush	0	±	+	+++	++	0	0	
Corneal haze	0	±	+	+(Local)	+(Local)	0	0	
Pupil size	9	7	5	6	6	7	7	
Iris hyperemia	0	+	+(Local)	++	0	±	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 8								
Conjunctival hyperemia	0	0	±	+	0	±	0	0
Ciliary flush	0	±	+	+	++	+	±	0
Corneal haze	0	±(Local)	±(Local)	±	+(Local)	+(Local)	0	0
Pupil size	8	7	7	8	7	5	6	8
Iris hyperemia	0	++	+(Local)	0	+(Local)	+	0	0
Lens haze or opacity	0	0	0	0	0	0	0	0
EYE 9								
Conjunctival hyperemia	0	0	0	0	0	++	±	
Ciliary flush	0	+	±	0	+	±	+	
Corneal haze	0	0	0	0	0	0	0	
Pupil size	4.5	5	7	8	6	5	5	
Iris hyperemia	0	0	0	0	0	0	0	
Lens haze or opacity	0	0	0	0	0	0	0	
EYE 10								
Conjunctival hyperemia	0	0	0	0	0	0	+	
Ciliary flush	0	+	+	+	++	±	+	
Corneal haze	0	0	0	0	0	+(Local)	+(Local)	
Pupil size	5	5	7	8	5	7	7	
Iris hyperemia	0	0	±	0	++	0	±	
Lens haze or opacity	0	0	0	0	0	0	0	

uronidase was injected and in Eye 8 approximately 16.32 times as much hyaluronidase was used.

SUMMARY

Various ophthalmologic uses of hyaluronidase are reviewed. The clinical and experimental work of Linn and Ozmet[6] is presented; these authors reported that instillation of hyaluronidase into the anterior chamber of the rabbit eye produced iritis, clouding of the cornea, and keratectasia.

The results are compared with our series in which no adverse effects of consequence were

TABLE 1

Prevalence of blindness according to census registration

Year	Number of Blind	Rate per 100,000 Population
1880	192	270
1890	273	380
1910	305	360
1920	387	410
1930	371	340
1940	379	310
1950	364	254

cording to the census). Of these, 372 or 91 percent were over 59 years of age. As far as he could ascertain, glaucoma simplex had been responsible for the blindness in about 70 percent of the cases.

Present survey

With the aid of the general census taken on December 1, 1950, and with the further assistance of the Association for the Aid of Blind People, I have been able to trace 434 blind people in Iceland. This must be regarded as a minimum figure, as it is unlikely that every single case has been detected. Here I have termed as blind people those whose corrected vision was 3/60 Snellen or less.

The total number of population in 1950, according to the census, was 143,961. Accordingly, the rate of blindness is 300 per 100,000 population, which is a much higher rate than in Europe or in America. In England, according to the 1949 registration, the blindness rate was 179 per 100,000 population. For France (census 1946) the rate was 107; Netherlands (special survey 1948) 47; Norway (special survey 1948), 99; the United States (estimate 1950), 173; and Canada (registration 1948), 125 (Epidemiological Vital Statistics Report, **6**: No. 1, 1953).

Although it may be assumed that the enumeration of blind people is liable to be less accurate in the more populous countries, it seems safe to conclude that blindness is actually considerably more prevalent in Iceland than in other countries with a comparable standard of general health.

Table 2 shows the distribution of blindness according to age and sex. Of the total number, 243 are males (56 percent) and 191 females (44 percent). For children (0 to four years of age) the blindness rate is unusually low (five per 100,000) and for the young and middle-aged up to 60 years, the rate is not conspicuously high. But after the age of 60 years and especially after the age of 70 years is reached, the rate increases rapidly, even to such extent that, in the age group 70 to 79 years, 19 per thousand are blind, in the age group 80 to 89 years, every 10th person, and in the group 90 years and over every fourth person, at least, is blind.

Figure 1 further illustrates the age dis-

TABLE 2

Age distribution of blind population

Age Groups (years)	Males	Females	Both Sexes	Percent	Rate per 100,000
0– 4	1	0	1	0.2	5
5–14	4	1	5	1.1	19
15–19	1	2	3	0.6	25
20–29	0	3	3	0.6	13
30–39	5	4	9	2.1	47
40–49	7	2	9	2.1	56
50–59	9	9	18	4.1	135
60–69	16	20	36	8.3	434
70–79	64	31	95	22.1	1872
80–89	109	78	187	43.2	9800
90 and over	26	40	66	15.1	26613
Not stated	1	1	2	0.5	
Total	243	191	434	100%	

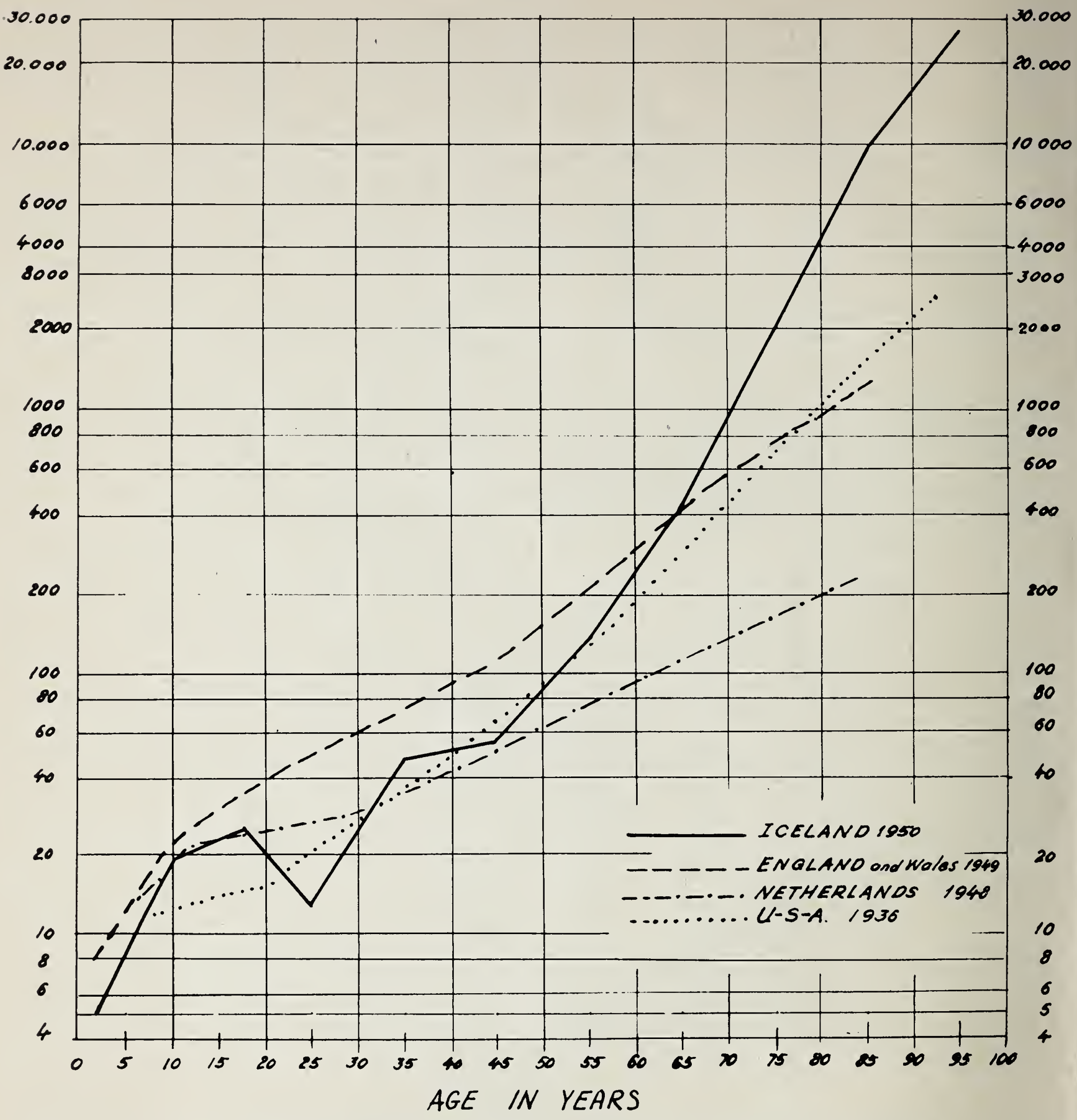

Fig. 1 (Björnsson). Blindness rates in age groups in Iceland as compared with some other countries. Rates per 100,000 population. (The curves for England, the Netherlands, and the United States are drawn from data given in *Epidemiological and Vital Statistics Report,* **6**: No. 1 [Jan.] 1953.)

tribution of blindness characteristic for Iceland. Up to the age of 60 years the rate of increase with age is on the whole similar to that observed in other countries but thereafter an extraordinarily rapid rise takes place. Thus, of the total number of blind, no less than 89 percent were 60 years of age and over, which is a much higher percentage than found elsewhere. It is obvious, therefore, that the unusually high general rate of blindness in Iceland is caused by a remarkably great prevalence of blindness among old people. This latter, again, is caused by the high incidence of glaucoma simplex as will be reported later.

It is of great importance to know at which age the blindness set on. My investigations revealed that 12 percent had become blind before the age of 15 years, 25 percent between 15 and 60 years of age, and 63 percent after the age of 65 years.

There is a considerable difference between the frequency of blindness in towns as contrasted to rural districts. The rate is 2.2 per thousand of the inhabitants of towns (population 88,408; of Reykjavik alone, 55,980) against 4.3 per thousand living in the rural districts (population 55,553). The reason for this may be, partly, that it is more difficult for old people in the rural districts to get adequate and controlled treatment than it is for people living in towns, especially in Reykjavik, where there is a sufficient number of ophthalmologists. Another reason is, that people belonging to the higher age groups are comparatively more numerous in the rural districts than in the towns, as young people have left the rural districts and settled in the towns in increasing numbers during the past few years.

Causes of blindness

Of the 434 blind in Iceland, I have had the opportunity to examine 143, or about 33 percent of the total cases. Most of these people live in Reykjavik.

Table 3 shows the age distribution of the analyzed cases. Although this table represents about one third of the total material, its representative value may be impaired by its being derived from one locality (Reykjavik) only. It should also be noted that the age distribution differs slightly from that of the total material.

Table 4, in which the blind are grouped according to visual acuity, shows that about one third of all the patients are totally blind. Two thirds are blind according to Trousseau's definition of blindness.

Table 5 shows blindness according to causes.

TABLE 4

Various degrees of blindness

Visual Acuity	Number of Cases	Percent
No perception of light	46	32.2
Light perception only	19	13.3
Hand movements to finger counting under 1 meter	31	21.6
1/60 to 3/60 Snellen	47	32.9
Total	143	100.0

Glaucoma

It has been known for a long time, that blindness due to glaucoma is the most frequent cause of blindness in this country. Of the 143 persons examined, 75 (45 males and 30 females, all over the age of 60 years) had become blind from glaucoma; well over 50 percent of the persons examined or 66 percent of those aged 60 years and older. Allowing for the difference in age distribution

TABLE 5

Causes of blindness in Iceland (1950)

Cause	Number of Cases
Glaucoma simplex	75
Cataract, senile	7
Cataract, congenital	5
Retinitis pigmentosa	6
Myopia, excessive	6
Amotio retinae with myopia	2
Amotio retinae without myopia	1
Degeneration of cornea	3
Atrophia cerebralis congenita	1
Optic atrophy of various causes	6
Senile macular degeneration	9
Chorioretinitis	6
Iridocyclitis and keratitis	9
Sympathetic ophthalmia	4
Injuries	3
TOTAL	143

TABLE 3

Age distribution of analyzed cases

Age Groups (years)	Males	Females	Both Sexes	Percentage Distribution
0–14	5	1	6	4.2
15–59	11	13	24	16.8
60 and over	53	60	113	79.0
Total	69	74	143	100%

(tables 2 and 6), this would mean that 60 percent of the total cases of blindness were caused by this single disease.

For comparison, it may be mentioned that the corresponding figures are 13.4 percent in England (Sorsby, 1950), 11.6 percent in the United States (Lancaster and Foote, 1951), and 4.5 percent in Norway (Holst, 1952).

The glaucoma which occurs in Iceland is almost exclusively primary chronic simple glaucoma of the wide-angle type. Acute glaucoma is very rare in Iceland, about one or two percent of all cases.

Table 6, which gives the age distribution of 75 cases of blindness from glaucoma, shows that the patients with one single exception were all over 70 years of age. This table shows also the average age at the onset of blindness. According to this, it is rather rare that people in Iceland, or at least in Reykjavik, become blind of glaucoma before they have reached the age of 70 years.

It is remarkable (table 6) that 65 of the persons listed have had operations for the glaucoma, in some cases iridencleisis, in other cases trephining operations. In most of the cases, the patient had come so late for treatment that the eyes had become irreparably damaged and were on the verge of being "socially blind" when the glaucoma was first detected. Those not operated on, and with absolute glaucoma had not come to an ophthalmologist until the disease had reached a precarious state. A few patients had developed postoperative iridocyclitis or complicated cataract, which had further increased their blindness although glaucoma was termed the primary factor.

There is no exact information available on the frequency of glaucoma in Iceland. An experienced ophthalmologist has, however, reported that out of 9,000 ophthalmic cases he found well over five percent with glaucoma (Skúlason, 1933). The corresponding percentage is about one or two percent in most of our neighboring countries (Duke-Elder, 1945). Based on this observation, the same ophthalmologist is of the opinion that about one in every 100 persons in Iceland has glaucoma, in which case those in the entire country having glaucoma would number about 1,400 to 1,500 persons. This means that nearly every sixth person with glaucoma has become blind, apart from those many who suffer from impaired vision without being counted blind.

What causes this high percentage of blindness from glaucoma? No doubt the main reason is that many patients with this disease come too late to an ophthalmologist for treatment, and this is chiefly because the disease shows almost no symptoms and progresses slowly, with gradually diminishing visual acuity and progressive contraction of the visual field; persons over 60 years of age often think this is only a natural phenomenon of increasing senility and therefore put off coming for treatment until it is too late.

TABLE 6

GLAUCOMA CASES ANALYZED

Age Groups (years)	Number Examined	Number of Glaucoma Cases	Number of Cases Operated	Average Age at Onset of Blindness (years)
0–59	30	0		
60–69	18	1	1	
70–79	26	21	20	68
80–89	54	41	35	74.6
90 and over	15	12	9	82.2
Total	143	75	65	

When glaucoma patients come for treatment before the disease is too far advanced, good results are obtained in 70 to 80 percent of the cases.

OTHER CAUSES

Blindness caused by senile cataract is not common in Iceland, and besides, most of the patients are operated on before they are counted blind. The seven patients with cataract whom I examined were so enfeebled with age that they were not considered able to stand the strain of an operation, or they suffered from senile macular degeneration.

Most of the cases of chorioretinitis, iridocyclitis, and keratitis were considered of tuberculous origin; therefore, it is possible that the new drugs used in the therapy of tuberculosis may in the future help to decrease the number of blind. Tuberculosis has declined in Iceland for the last two decades, chiefly the result of a systematic search for carriers of the disease.

In other groups of blindness it will probably not be possible to decrease the number of cases for some years to come for they are mostly cases of hereditary or degenerative origin. I found seven cases of blindness from accidents, in four of which the patients had become afflicted with sympathetic ophthalmia. I do not know of any case of blindness caused by industrial accident.

Blindness caused by syphilis, ophthalmia neonatorum, trachoma, and xerophthalmia is unknown in Iceland.

Six children in the whole country under the age of 15 years were registered blind. I have had occasion to examine all of them. Three of them had congenital cataract; all were idiots. They had all been operated on but with poor result. One was blind from congenital atrophy of the cortical visual center. Another had atrophy of the optic nerve postencephalomeningitis. The sixth one, blinded by an explosion, had for some years been the only pupil at the School for the Blind in Iceland.

PREVENTIVE MEASURES AND FUTURE OUTLOOK

There is little doubt that the incidence of blindness—already falling as can be judged from the census figures—can be reduced to a considerable extent.

Ophthalmology as a specialty is of comparatively recent origin in Iceland. Until 1920, only one ophthalmologist had practised in the whole country; after that date, the number increased. Optometrists have never been allowed to practise. For several years four ophthalmologists have, on behalf of the health authorities, travelled about in the country for two months every summer. They have found many glaucoma patients who otherwise would have come too late for treatment. They have also had opportunity to examine postoperative glaucoma cases.

Radio lectures have been arranged and articles published to inform the people about glaucoma and its perilous character. These measures do not seem to be sufficient to make people come in time for treatment. Plans are, therefore, now being considered to start a systematic search for glaucoma cases among people over 60 years of age. This ought to be possible, as there are only 16,000 persons 60 years of age and over in Iceland. By these means glaucoma ought, in most cases, to be detected in the early stages and the treatment accordingly be made more easy, whereupon it might be expected that, after some years, the number of blind in Iceland will have decreased considerably. It is also of great importance to search for cases of hereditary glaucoma, as heredity seems to be a conspicuous factor in Iceland.

SUMMARY

In a special survey based on the general census of 1950 and supplemented with further information obtained through the aid of the Icelandic Blindness Association, 434 blind persons were traced throughout the whole country (the census figure was 364). The blindness rate therefore is 300 per

100,000 population, which is a much higher rate than known elsewhere in Europe or America. It is, however, only after the age of 60 years that the blindness is frequent, 89 percent of all the blind persons being above that age. The most common cause of blindness, glaucoma simplex, is responsible for approximately 60 percent of the total number of cases, although it rarely occurs below the age of 70 years. Measures aiming at reducing the blindness rate should be directed primarily against glaucoma.

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References

Epidemiological and Vital Statistics Report. **6**: No. 1 (Jan.) 1953.
Duke-Elder, W. S.: Textbook of Ophthalmology. London, Kimpton, 1945, v. 3, p. 3,328.
Holst, J. C.: The occurrence of blindness in Norway. Am. J. Ophth., **35**:1153-1166, 1952.
Lancaster, W. B., and Foote, F.: The battle against blindness. J.A.M.A., **145**:26 (Jan.) 1951.
Skúlason, H.: Um glaukomblindu. Reykjavík, 1933.
Sorsby, A.: The causes of blindness in England and Wales. Medical Research Council Memorandum No. 24, London, 1950.
Sveinsson, K.: Blindir menn á Islandi. Heilbrigt líf, **4**:5-18, 1944.

BENIGN CALCIFIED EPITHELIOMA OF EYELID*

Walter Kornblueth, M.D., and Erich Liban, M.D.
Jerusalem, Israel

Benign calcified epithelioma is rarely mentioned in the ophthalmic literature. The clinical diagnosis of this lesion is practically impossible and the histologic features may present some difficulties in diagnosis.

Case report

A woman, aged 23 years, was seen in the out-patient department in October, 1953, complaining of a localized swelling in her left upper lid. Six weeks before she was hit by a hammer in the region of her left eye. The upper lid became swollen and, as the swelling subsided, she noticed a painless nodule beneath the skin of the upper lid. At first she paid no attention to it but, when the nodule increased in size, she decided to consult an ophthalmologist.

The patient had been seen previously in 1944 for a skin erosion in her left upper lid following a slight injury. The wound healed without complications within a few days. In February, 1953, she came to the clinic for treatment of an external stye in the same lid. The patient visited our clinic on and off for treatment of an alternating squint combined with a refractive error.

Present examination revealed a small round tumor in the left upper lid, five mm. from the upper and six mm. from the temporal orbital margin. It was hard, adherent to the overlying skin, and freely movable from the underlying tissue. The regional preauricular lymph gland was not enlarged. A clinical diagnosis of atheroma was made and the tumor was completely removed. The postoperative course was uneventful.

Microscopically, the lesion was a hard, well-encapsulated nodule, seven mm. in diameter. The cut surface was grayish-white and contained minute foci of friable material.

Histologically, the lesion was composed of a cellular stroma in which were two types of epithelial cells arranged in nests of various sizes.

One cell type consisted of weakly stained squamous cells with well-preserved cell

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* From the Departments of Ophthalmology and Pathology of the Rothschild Hadassah University Hospital.

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